

**WHAT IS CLAIMED IS:**

1. A multifunctional analog trunk (TRK) circuit provided in a switching system connected with a central office line, said TRK circuit being connectable between (1) a tip terminal, "M" terminal and "E" terminal of said switching system and (2) a hybrid circuit and codec of a switching circuit, said TRK circuit comprising:

a first relay connectable with said tip terminal of said switching system;

a second relay for connectable with a ring terminal of said switching system;

said first relay and said second relay provide control of a polarity reverse in DID (Direct Inward Dialing tie line) trunk mode;

a transformer comprising a primary coil and a secondary coil, an upper end of said secondary coil connectable with the codec and hybrid circuits of said switching circuit and a lower end of said secondary coil is grounded;

a third relay connected between an output of said first relay and an upper end of the primary coil of said transformer for occupying a loop in one of a loop and a ground start TRK mode;

a ring path connected in parallel with both ends of said third relay for transferring a ring signal coming from said central office line;

a fourth relay driven in said ground start TRK mode, said fourth relay being cut off when said third relay occupies said loop;

a tip ground detection circuit connected with an output of said fourth relay for detecting a grounding of said tip terminal in said ground start TRK mode;

a fifth relay connected with an output of said second relay to be driven in said ground start TRK mode;

a ring ground enable circuit connected with an output of said fifth relay for grounding said ring terminal in said ground start TRK mode;

5 a bridge diode connected in parallel with the primary coil of said transformer for full-wave rectification of a signal transferred through said ring path;

a sixth relay connected between said ring path and said bridge diode;

a seventh relay connected between said bridge diode and the output of said second relay;

10 said sixth relay and said seventh relay for providing dial pulses in said loop or ground start TRK mode;

a bypass circuit connected with an output of said bridge diode to bypass a direct current voltage output of said bridge diode in said loop or ground start TRK mode;

a ring and HOS detection circuit connected with said bypass circuit for detecting the  
15 ring and HOS signal in said loop or ground start TRK mode, and said HOS signal in said DID TRK mode;

a feeding circuit connected with said "M" terminal to supply a prescribed source voltage to said sixth and seventh relays;

an eighth relay connected with said "M" terminal for grounding said "M" terminal  
20 when idle and for supplying said source voltage to said "M" terminal in E&M TRK mode;  
and,

an HOS signal detection circuit connected with said "E" terminal to detect said HOS signal in said E&M TRK mode.

2. A multifunctional analog TRK circuit according to claim 1, wherein  
5 said first relay and second relay are paired;  
said third relay and said fourth relay are paired;  
said fifth relay and said eighth relay are paired; and,  
said sixth relay and said seventh relay are paired; wherein each pair of relays is  
simultaneously operated.

10 3. A multifunctional analog TRK circuit according to claim 2, wherein each relay in  
each of said pair of relays is a single-pole double-throw type.

15 4. A multifunctional analog TRK circuit according to claim 1, wherein said TRK  
circuit resides in a single board.

5. A multifunctional analog TRK circuit according to claim 1, further comprising:  
a first zener diode and a second zener diode being connected in series , and said  
first and second zener diodes being connected in parallel with said secondary coil of said  
20 transformer, so that an anode of a said first zenor diode is connected to an upper end of said  
secondary coil and a cathode of said first zener diode is connected with a cathode of said  
second zener diode.

6. A multifunctional analog TRK circuit provided in a switching system connected with a central office line, said TRK circuit being connectable between (1) a tip terminal, "M" terminal and "E" terminal of said switching system and

(2) a hybrid circuit and codec of a switching circuit, said TRK circuit comprising:

5 a first relay connectable with said tip terminal of said switching system;

a second relay connectable with said ring terminal;

said first relay and said second relay provide control of a ring signal in ring down TRK mode;

a transformer comprising a primary coil and a secondary coil, said secondary coil  
10 connectable with the codec and hybrid circuits of said switching circuit;

a third relay connected between an output of said first relay and an upper end of the primary coil of said transformer for occupying a loop in one of a loop and a ring down TRK mode;

a ring path connected in parallel with both ends of said third relay to transfer a ring  
15 signal coming from said central office line;

a bridge diode connected in parallel with the primary coil of said transformer for full-wave rectification of a signal transferred through said ring path;

a fourth relay connected between said ring path and said bridge diode;

a fifth relay connected between said bridge diode and an output of said second  
20 relay;

said fourth relay and said fifth relay provide dial pulses in said loop, ring down or both way TRK mode;

a bypass circuit connected with an output of said bridge diode for bypassing a direct current voltage output of said bridge diode in said loop or both way TRK mode;

a ring & HOS detection circuit connected with said bypass circuit to detect the ring and HOS signal in said loop or ring down TRK mode, and said HOS signal in said both way TRK mode;

a feeding circuit for supplying a prescribed source voltage to said fourth and fifth relays in said both way TRK mode;

a sixth relay connected with said "M" terminal for supplying said source voltage to said "M" terminal when idle, and for grounding said "M" terminal in E&M TRK mode;

and,

an HOS signal detection circuit connected with said "E" terminal for detecting said HOS signal in said E&M TRK mode.

7. A multifunctional analog TRK circuit according to Claim 5, wherein

said first relay and said second relay are paired;

said fourth and fifth relays paired; and,

each pair of relays is simultaneously operated.

8. A multifunctional analog trunk (TRK) circuit provided in a switching system

connected with a central office line, said TRK circuit being connected between (1) a tip terminal, "M" terminal and "E" terminal of said switching system, and (2) a primary coil of a transformer which is part of a switching circuit, said TRK circuit comprising:

a first relay for connection with said tip terminal of said switching system;

a second relay for connection with a ring terminal of said switching sysyem;

said first relay and said second relay for controlling a polarity reverse in DID  
(Direct Inward Dialing tie line) trunk mode;

5 a third relay connected with an output of said first relay, and said third relay is  
connectable with the primary coil of said transformer of said switching circuit for  
occupying a loop in one of a loop and a ground start TRK mode;

a ring path connected in parallel with both ends of said third relay for transferring a  
ring signal coming from said central office line;

10 a fourth relay being driven in said ground start TRK mode, and said fourth relay  
being cut off when said third relay occupies said loop;

a tip ground detection circuit connected with an output of said fourth relay for  
detecting a grounding of said tip terminal in said ground start TRK mode;

a fifth relay connected with an output of said second relay, said fifth relay being  
15 driven in said ground start TRK mode;

a ring ground enable circuit connected with an output of said fifth relay for  
grounding said ring terminal in said ground start TRK mode;

a bridge diode connected in parallel with said transformer for full-wave rectification  
of a signal transferred through said ring path;

20 a sixth relay connected between said ring path and bridge diode;

a seventh relay connected between said bridge diode and an output of said second  
relay;

a bypass circuit connected with said "M" terminal for grounding said "M" terminal when idle and for supplying said source voltage to said "M" terminal in E&M TRK mode;

an HOS signal detection circuit connected with said "E" terminal to detect said HOS signal in said E&M TRK mode.

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